

**FINAL PROJECT**

**VARIATION EFFECT OF FIBER COMPOSITION  
AND DIRECTION TOWARD COMPOSITE  
MECHANICAL PROPERTIES, FIBERGLASS  
FIBER WITH POLISTER MATRIX MATERIAL**



**Submitted as a Partial Fulfillment of the Requirements for Getting  
Bachelor Degree of Engineering in Automotive Department**

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October 2014**

## **DECLARATION OF RESEACH AUTHENTICITY**

I assert verily that the research entitles.

### **VARIATION EFFECT OF FIBER COMPOSITION AND DIRECTION TOWARD COMPOSITE MECANICAL PROPERTIES, FIBERGLASS FIBER WITH POLISTER MATRIX MATERIAL**

That made to fulfill some of requirement to get Bachelor Degree of Engineering in Automotive Department of Muhammadiyah University of Surakarta, as far I know is not a plagiarism of research that has been published, except the information source that to solve the problem.

Surakarta, October 2014

Researcher,

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Roberto Agus Mainaki

## APPROVAL

The final project entitles **“Variation Effect of Fiber Composition and Direction Toward Composite Mecanichal Properties, Fiberglass Fiber with Polister Matrix Material”**, has been approved by supervisor and authorized by Director of International Program as partial fulfillment of the requirements for getting the Bachelor Degree of Engineering in Automotive Department of Muhammadiyah University of Surakarta.

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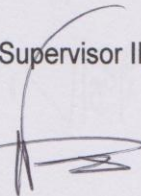
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## MOTTO

*Success is not measured by wealth, success is an achievement  
that we want.*

*To get a success, your courage must be greater than your fear.*

*Do whatever you like, be consistent, and success will come  
naturally.*

*Intelligence is not the determinant of success, but hard work is  
the real determinant of your success.*

*Wise man talks because they have something to say. Fool man  
talks because they have to say something.*

*If you cannot be a smart person, so be a good person.*

*“Verily, never will Allah change the condition of a people until  
they change it (their state of goodness)” (QS. Ar-Ra’d: 11)*

*“Nay, seek (Allah’s) help with patient perseverance and prayer:*

*It is indeed hard, except to those who bring a lowly spirit”*

*(QS. Al-Baqarah: 45)*

## **DEDICATION**

This Research paper is dedicated to:

Allah SWT,

Thanks for the best everything that you have given for me and thanks for you love that always make me to never give up to do the best. I believe that you will always give me the best for everything.

My beloved Mom (Rumiatun) and Dad (Sukaji Mustofa),

Thanks for you prayer, love, support and affection.

You always give me happiness but often I made you disappointed.

I am sorry and I promise to give you the best the future.

My Sister (Siti Rojana Dwi Novista Sari)

Thanks for you support.

It is make strong to get something more and more.

My honey (Nordina Sari),

Thanks for you love, support, attention, spirit and advice.

All my friends (Automotive Engineering “2010”, etc)

Thanks for support and love me.

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13. Those who cannot be mentioned one by one, writer wants to say his **thank and appreciation to all of them.**

The writer realizes that this research paper is far from being perfect, so the writer sincerely welcomes any constructive comment, criticism, and suggestion.

*Wassalamu 'alaikum Wr. Wb.*

Surakarta, October 2014

The Writer

**Roberto Agus mainaki**



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## LIST OF SYMBOL

$W_1$	= Activated Energy (J)
$W_2$	= Absorbed Energy (J)
$\lambda$	= Arm length (m)
$\alpha$	= Beginning angle
$\beta$	= Ending angle
$K$	= Impact value (j/mm <sup>2</sup> )
$A$	= Cross sectional area (mm <sup>2</sup> )
$\sigma_b$	= Bending Stress (MPa)
$P$	= Max Load (N)
$L$	= Distance between supporter (mm)
$b$	= Width (mm)
$d$	= Thick (mm)
$P$	= Load
$A_0$	= Cross section
$E$	= Modulus elasticity (kg/mm <sup>2</sup> )
$\sigma_u$	= Ultimate Stress (MPa)
$\varepsilon$	= Strain (%)



## ABSTRACT

With the development of technology, it is found, new technology in modification motorcycle body, so a lot of people utilize composite for making motorcycle body with the performance they want.

It is easy to make body of motorcycle in willingness. There are three materials in the modifications motorcycle body (catalyst, resin and fiberglass). Fiberglass is a light material, and it is very strong. Though the character of its strength rather lowers that carbon fiber and less stiff, the material which is usually fragile, and the standard material is cheaper. Missal strength and weight character of body is also to make more than metal, and it is easy to make with the press. The purpose of the research is to know the strength of different fibers, from random fiber, woven fiber, and one direction fiber.

Testing is done by differentiating three fibers (random fiber, woven fiber, and one direction fiber) with catalyst composite and the same resin. Every fiber tests with impact test that is based ASTM D - 256, bending test based on ASTM D - 790 and tensile test that is based on ASTM D - 638.

The composition of a catalyst 4.76 % of a resin used, and use of composite volume faction 37.1 %. Analysis is done after getting result data of testing. The result from each testing has a different result. Numbers of height of impact test are gotten from one direction fiber  $0.82 \text{ J/mm}^2$ , flexure stress is gotten from woven fiber 29.89 MPa, tensile strength is gotten from woven fiber 66 MPa, and elastic modulus from woven fiber  $142.268 \text{ kg/mm}^2$ . The strength to hold is a strength and character as tenacity, strength, hardness etc, it can be considered by data which are gotten from the results of the test.

**Keywords:** catalyst, fiberglass, resin, and impact test, bending test, tension te.